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Berenstein et al.

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[54] **ULTRASOFT EMBOLISM COILS AND PROCESS FOR USING THEM**

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[58] **Field of Search** 606/194, 191, 606/159, 151, 198; 604/159, 164; 128/772; 428/906, 371, 592; 623/1, 11, 12

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[57] **ABSTRACT**

This invention is an exceptionally flexible, ultrasoft vaso-occlusive or embolism forming device. It is made of a radiopaque material which may be braided or coiled to form a long, thin threadlike device having little rigidity or column strength. The diameter of the device may be less than about 0.010 inches. The wire making up the device used to form the coil or braid is typically of a diameter less than about 0.002 inches. The device is sufficiently flexible and small that it may be hydraulically delivered to a site within the vasculature of the human body using an injected drug or fluid flush through a catheter. The device assumes a loose, random mass of threadlike material after being ejected from the catheter tip at the chosen vascular site. The device (whether coil or braid) may be used alone or in conjunction with larger coils or braids to achieve a denser occlusion or as a substrate to localize the subsequent infusion of tissue adhesives, particulate embolization devices, or chemotherapeutic agents in abnormal blood vessels and tissues or for the temporary occlusion of blood vessels during types of diminished blood flow testing. The invention also include processes for introducing the devices into the human body.

27 Claims, 4 Drawing Sheets